searches of Mr. Parker, Prof. Huxley, and antecedent Continental authors are ignored, and the essential affinity between the embryonic mammalian skull and its permanent condition in Batrachians and cartilaginous fishes is passed over in silence.

Similar incompleteness is to be found in treating of single organs in single classes. Thus, in speaking of the swimming bladder, its homology with the lung is only faintly alluded to in terms hardly of approval, and nothing is said of its interesting condition in Polypterus.

As to Birds, the inquirer who consults this manual only will fail to acquire any really adequate knowledge of the class, from the absence of all description of its two very distinct existing types—the struthious and the carinate birds. As regards the omission of any notice of the Archæopteryx, it may be pleaded that it is a fossil form; still a manual of zoology must be reckoned as singularly incomplete which fails to call attention to a form so importantly aberrant.

In the highest class of Vertebrates we miss any adequate statement of the very great gap which exists between the Monotremes and the higher Mammals.

Prof. Flower's careful labours regarding the corpus callosum are utterly ignored. Thus we read, "In those Marsupial tribes that form the connecting links between the oviparous and placental Vertebrata, the brain still exhibits a conformation nearly allied to that of the bird, and the great commissures required in the more perfect encephalon are even yet deficient; but in the simplest brain of a Placental Mammifer the characteristic differences are at once apparent." The student is left entirely in the dark as regards the large anterior commissure of the lower forms which compensates, as it were, for the reduction of the corpus callosum, while presenting such a contrast to the brains of birds and reptiles.

The facts here mentioned will enable the zootomically instructed reader to appreciate the defects which unhappily characterise this last production of Prof. Rymer Jones. As we have said, they do not prevent the volume being replete with both interest and instruction, and a large number of readers may study it with advantage, though it is not calculated for young students who wish to be *au courant* with the latest views and those received by the most esteemed biologists. The prevailing character of the book may be summed up by saying that we have in it almost a maximum of physiological anatomy with a minimum of morphology.

Turning to the much smaller work of Dr. Nicholson, we feel refreshed by coming in contact with a body of more modern views and less-known facts put forth concisely and in a form really useful to the student. There is a copious glossary, the utility of which will far more than compensate for some inaccuracies. There is also (what no book of the kind should lack) an alphabetical index, the want of which will be sadly felt by those who use Prof. Rymer Jones's volume. Nevertheless, Dr. Nicholson's manual, though serving as a stop-gap to supply an urgent need, is not, by any means, all that could be desired. Some of the very glaring omissions we have noticed in the large work are also defects in the smaller one. Thus we have again the absence of any reference to the Rhizocephala, but that larval Ascidian structure is noticed "which has been paralleled with the chorda dorsalis of Vertebrates."

The Brachiopoda are relegated to the vicinity of the Polyzoa, and removed from the Mollusca proper. The Batrachia are associated with the fishes, the Reptila with the Birds. Man is put back into the order Bimana, which appears to us a mistake when he is considered from the zoological point of view only. Investigations and discussions of recent date have abundantly demonstrated that in bodily structure he differs far less from the higher "so-called" Quadrumana than do these latter from the lowest members of that order. In connection with recent investigations it must be remarked that Dr. Nicholson does not sufficiently acknowledge how largely his work reposes on the labours and teachings of Prof. Huxley. That Professor's system and arrangements are almost entirely adopted, even to the location of the class Echinodermata in the subkingdom Annuloida.

It is much to be regretted that the last-named eminent naturalist has not ere this given to the world the results of his labours in his own clear and terse language, and published a model handbook for the use of students. In the absence of such a desideratum we feel sure that Dr. Nicholson's work will, for a time, be deservedly popular and widely used. More than this we cannot, however, anticipate for it without careful and copious additions and emendations.

OUR BOOK SHELF

A History of the Birds of Europe, including all the Species inhabiting the Western Palæarctic Region. By R. B. Sharpe, F.L.S., &c., and H. E. Dresser, F.Z.S., &c. Part I. (London: published by the Authors.)

THIS work will supply a great want, since it will give in a convenient form and at a moderate price, a really good coloured figure with a full and accurate description and history of every European bird. The talent of Mr. Sharpe for publications of this nature has been sufficiently shown by his beautiful work on the kingfishers, which we have already noticed, while his colleague, Mr. Dresser, is an enthusiastic student of European birds. In M. Keulemans they have secured an artist who bids fair to rival Wolf in the delineation of bird character; and if the work maintains the standard of its first part (and we have every reason to believe it will do so), its subscribers will have cause to be satisfied. We find in the part now issued eight species of birds beautifully figured, and about forty-six pages of letterpress, crowded with information from every available source on the habits and distribution of the species. The series of charming pictures of the most graceful of all living things which this work will give, must render it a general favourite; and it will assuredly help to extend the growing taste for natural history, by rendering it comparatively easy for the traveller or resident on the Continent to determine the species and refer to an outline of what is known about any bird he may meet with during his rambles in the country or in the markets. To the home naturalist, also, it will prove far more interesting than a work on British birds alone; for he will here find how far over the globe his feathered friends are accustomed to range, and will make the acquaintance of many members of their several families who, although they live permanently abroad, yet retain a strong likeness to their English relations. We heartily wish Messrs. Sharpe and Dresser success in their bold and laborious undertaking.

A. R. W.

A Treatise on the Action of Vis Inertiæ in the Ocean. By W. Leighton Jerdan, F.R.G.S. (London: Longmans.)

THIS book is a lamentable instance of misconception and error. It is founded on a denial of the first law

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of motion that a body, if moving, will continue to move in a straight line with uniform velocity, provided no forces act on it. There is through the whole book the most hopeless confusion as to what is meant by no forces acting. The author's theory of the cause of the moon's motion will illustrate the character of the book. It is briefly this :—If the moon were pulled only by the earth's gravitation, it must fall to the earth. It must therefore be pulled in the opposite direction with an exactly equal force. This is called by the author the force of astral gravitation. Since these two exactly balance one another, the question arises, What can cause the moon to revolve round the earth? "A cause," says the author, "for the onward motion of the moon according to the action of well-known laws, is, however, indicated by various well-known tidal phenomena. For the moon tends to raise a mass of water or tide on the earth's surface beneath it; and as the earth's surface rotates eastward, it tends to carry that mass of water or tide with it; and therefore as the moon tends to hold the tide beneath it, the rotation of the earth eastwards must just as certainly tend to carry the moon eastwards as to carry the tide eastwards." Really it is quite irritating that such nonsense should be printed in large type, on good paper, and in a well-bound book.

It is one of the great merits of error that it is inconsistent. That the author enjoys the full satisfaction of this merit is evident from the following :—" If the moon and earth were at rest, then astral gravitation would tend to carry the moon directly from the earth, not at a tangent to any part of its orbit; and when in motion, astral gravitation tends to carry the moon off at a tangent from its orbit certainly, but *in the opposite direction to that of its motion* at the moment of its being released from the grasp of the centripetal force." The italics are the author's—not ours. It appears from this that the author denies the second law of motion, as well as the first, which he elsewhere denies. He here assumes that the effect of a force on a body at rest can be at right angles to its effect on that body when in motion. It is much to be desired that those who undertake to write books would first learn the first principles of that which they write about.

Catalogo Poliglotto delle Piante. Compilato dalla Contessa di San Giorgio. 8vo., pp. i., 747. (Firenze, 1870.)

WE wish to call our readers' attention to this interesting little volume. Its authoress will be better known in the country as Lady Harly of Oxford; and she has spent many years in the compilation of this volume, which, we think, may prove useful to travellers on the Continent, and indeed, might even be made the means of instruction in our public schools. As an example, we select the *Bellis perennis*, which, a native of Europe, we find is, in English Daisy; French, Paquerette, *Marguerite vivace*, Fleur de Pâques; Italian, Pratolina, Margheritina de Prati; Spanish, Maya, la Margarita; German, Masslieben, Gänse Blümchen, Angerblume, Osterblümchen. But we find not only the European names of a large number of plants given, but even in some instances, the Sanskrit, Bengal, Hind and Tamul names are also appended.

W.

LETTERS TO THE EDITOR

[*The Editor does not hold himself responsible for opinions expressed by his Correspondents. No notice is taken of anonymous communications.*]

Variability and Natural Selection

I ASK your permission to address to your readers some observations in support of the argument which Mr. St. George Mivart has adduced in his work on "The Genesis of Species," that Mr. Darwin has attributed too exclusive an effect in the origination of new species to the influence of his law of Natural Selection.

1. There are two facts on which Mr. Darwin's theory reposes —the one the variability of animal and vegetable forms; the other, the accumulation of a useful variation by force of the struggle for existence, or Natural Selection. Mr. Darwin assumes Variability to be accidental, not because he or any other philosopher supposes that there is such a thing as accident, but because its law is unknown. He then finds the law of Natural Selection, and by this and this alone, explains the Genesis of Species.

Now, inasmuch as Natural Selection operates on Variability as a pre-existing fact, it follows that the genesis of a new species must result from the operation of two laws—namely, the law of Variability and the law of Natural Selection. But Mr. Darwin attributes it exclusively to the latter; so that, according to his view, there is a law (that of variability) which has no part in producing a result which yet depends for its existence on the fact regulated by that law—namely, variation. This is enormously improbable. It is as if the resultant from two factors were attributed exclusively to one of these factors.

The fact that Mr. Darwin assumes variation to be accidental is, of itself, sufficient to make us expect some residual phenomenon not accounted for by the law of selection: but Mr Darwin's argument does not allow the existence of such a residuum.

2. Mr. Mivart, following the *North British Review*, has shown the great advantage in the struggle for existence which the numerical superiority in individuals of the original form over the new variation may give to the original form. I want to call your attention to the fact, that the useful variety has to overcome not only this advantage to its antagonist resulting from numbers, but a quite distinct difficulty, namely, the tendency to reversion; or, that in other words, the force which Mr. Darwin has at his disposal is not the tendency to accumulate a variation, but only the balance of this tendency over the tendency to reversion.

It is no doubt difficult to estimate the extent to which one tendency is controlled by the other; but to gain some notion of it, let me assume the existence of three forms, with a male and female of each, viz.,

male	female
a	a' the original form
b	b' the first variety
c	c' the second variety

Let me further indicate the existence of an accumulated variation by the double letter bb, or cc. Let me then assume an equal chance of sexual intercourse between each of the six individuals and of progeny from such intercourse, and we shall see what are the chances of the origin of an accumulated form. For the union of

a	and	a'	produces	a
a	,,	b'	,,	a
a	,,	c'	,,	a
b	,,	a'	,,	a
b	,,	b'	,,	bb
b	,,	c'	,,	a
c	,,	a'	,,	a
c	,,	b'	,,	a
c	,,	c'	,,	cc

So that in the first generation the chance against any given accumulated variation being produced are 8 to 1, and the chances against any accumulated variety at all being produced are 7 to 1; and these odds will go on increasing, because the next generation will retain the tendency to revert to the original simple parent form a, not to the original forms of the last preceding generation only. If I assume that each marriage in the first generation produced two males and two females, the result will be, that in the second generation the chance against any given accumulated variety being produced will be 320 to 4 or 160 to 2; and the chance against any accumulated variety at all being produced will be 316 to 8 or 79 to 2.

These chances express the force of the tendency against which Natural Selection has to operate, assuming that the numbers of each variation at starting were equal to those of the original form; but this is, on the assumption that variation is accidental, infinitely removed from the truth; and if the difference between the numbers of the original form and the variation be introduced into the case, the odds are indefinitely increased against the accumulation of a casual variety. None of these observations goes to show that Natural Selection does not exist (I have

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